REMARKS

Reconsideration of this application is respectfully requested.

Claims 1-8 are pending and claims 1, 2, 5, 6, and 7 have been amended. Claim 9 has been cancelled.

Independent claims 1, 5, and 6 have been limited by incorporating conditions (c) and (d) with regard to the lubricant. Condition (c) corresponds to a part of original claim 2 or 7, and condition (d) corresponds to original claim 9. Claims 2 and 7 have been amended and claim 9 has been cancelled accordingly. No new matter has been introduced by the amendments.

Claims 1, 4-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tinney, US Patent No. 6,543,394 as evidenced by Clark et al., US Patent Application Publication No. 2005/0241216.

Independent claims 1, 5, and 6 have been limited by incorporating a part of the subject matter of non-rejected claim 2 or 7, i.e., condition (c). The anticipation rejection should be overcome by the above amendments.

Though the patentability of claims 1, 4-6 and 9 is now clear, the applicants have the following comments on the cited references.

The Examiner points out that Tinney discloses use of Fischer-Tropsch fuel, which is taught in Clark to have essentially no or undetectable levels of sulfur, for lubricating a hard material such as a DLC coating.

However, according to the present invention, the base oil is defined as at least one of a hydrocracked mineral oil, a wax-isomerized mineral oil, and a poly-α-olefin base oil. Fischer-Tropsch fuel is irrelevant to the present invention.

The Examiner further points out that the fuel of Tinney is taught to have a viscosity in the range of about 1.5 to 4.5 cSt, which overlaps with the range including kinematic viscosity of 2 to 20 mm^2/s at 100 °C as recited in the claims of the present application.

However, Tinney does not disclose the temperature conditions for the viscosity. In that case, it is reasonable to take the temperature as room temperature, and then the viscosity disclosed in Tinney is clearly outside the visocity range defined in the present claims.

Therefore, it is respectfully submitted that amended claims 1, 5, and 6 as well as claim 4 depending from claim 1, are patentable over Tinney in view of Clark.

Claims 2-3 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tinney, in view of Yagishita, US Patent Application Publication No. 2005/0272616. This ground for rejection is respectfully traversed.

The lubricant recited in amended claim 1 now essentially calls for a sulfur-free metal detergent (condition (c)), which was originally recited in claim 2.

Before discussing the patentability of amended claim 1 over Tinney in view of Yagishita, the background and the features of the present invention are explained below.

The DLC material used in the system having DLC contact surfaces according to the present invention has been developed as a hard coating material which provides an excellent anti-wear property and a low frictional coefficient to the parts in engines or the like under severe frictional wearing, as described on page 2 of the specification. It is known that the DLC material has a lower frictional coefficient in the air in the absence of a lubricant, compared to other anti-wearing hard coating materials, but can offer only limited friction reducing effect in the presence of a lubricant.

Further, as described on pages 2 to 3 of the specification, it is known that sufficient friction reducing effect cannot be achieved by providing the DLC contact surfaces with a lubricant

containing an organic molybdenum compound, such as molybdenum dithiocarbamate (MoDTC) and molybdenum dithiophosphate (MoDTP), which, though, impart particularly excellent low frictional coefficient to conventional steel contact surfaces, among various friction modifiers capable of sufficiently lowering the frictional coefficient on such steel contact surfaces.

That is, in the background of the present invention, there was a problem that even a lubricant containing a friction modifier which exhibits excellent lowering of a frictional coefficient on steel surfaces, does not have a frictional coefficient reducing effect on DLC contact surfaces.

In the light of such a problem, according to the present invention set forth in amended claim 1, it has been discovered that an excellent low frictional coefficient is achieved on DLC contact surfaces by employing a particular lubricant which fulfills conditions (a) to (d) defined in amended claim 1, i.e., a lubricant which contains the particular base oil and a sulfur-free metal detergent as requisite components, has a sulfur content of not higher than 0.2 mass%, and is free of zinc dithiophosphate (ZnDTP) and sulfur-containing metal detergents. This effect is unexpected to one of ordinary skill in the art, and is specifically demonstrated in Examples and Comparative Examples in the present specification, and particularly shown in Tables 3 and 6.

Turning to the Office Action, to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success of the combination. Finally, the combination of references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the Applicants' disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q. 2d 1438 (Fed. Cir. 1991). Here, the applicants submit that the Examiner has filed to establish a proper motivation for combining the cited references.

The Examiner points out in paragraph 3 of the Office Action referred to in this rejection that Tinney discloses an internal combustion engine which has certain load bearing surfaces

including a hard coating material such as a diamond-like coating, and in which the fuel serves as the lubricant and the combustive agent (claim 1).

However, Tinney does not disclose any Example specifically demonstrating that the fuel serving as the lubricant and the combustive agent exhibited an excellent low frictional coefficient in lubricating a DLC surface.

Further, Tinney does not disclose any lubricant composition which contains a sulfur-free metal detergent, as defined in amended claim 1.

In this regard, the Examiner refers to Yagishita in paragraph 4 of the Office Action, and points out that this reference discloses a low sulfur lubricant composition for use in an internal combustion engine, wherein the base oil can be derived from hydrocracking and produced by isomerizing GTL wax, and which composition may contain an alkaline earth metal salicylate, which is a sulfur-free metal detergent.

However, Yagishita merely discloses a lubricant composition which has oxidation stability in the presence of water, and only oxidation stability tests were conducted in the Examples. This reference does not teach or even suggest to lower frictional coefficient.

Further, even if the disclosed lubricant composition may impart a lower frictional coefficient to steel materials, there is no suggestion that the lubricant composition could impart a lower frictional coefficient to DLC contact surfaces. The frictional coefficient of such contact surfaces is hard to lower as discussed above.

Thus, in the light of the background art of the present invention discussed above, one of ordinary skill in the art could not have applied the sulfur-free metal detergent of Yagishita, which is silent about lubrication of DLC contact surfaces, to the fuel of Tinney for the purposes of lowering the frictional coefficient of DLC contact surfaces.

Therefore, amended claim 1 into which original claim 2 has partially been incorporated, as well as claims 2-4 depending therefrom, is not obvious over Tinney in view of Yagishita. Further, amended claim 6 into which original claim 7 has partially been incorporated, as well as claims 7 and 9 depending therefrom are also not obvious over Tinney in view of Yagishita for the same reasons.

Claims 1-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirahama et al., US Patent Application Publication No. 2003/01662672. Independent claims 1 and 6 have been limited by incorporating the subject matter of non-rejected original claim 9. Thus, the rejection is believed to have been overcome by these amendments.

Specifically, the amended claims now clearly define that the lubricant is free of ZnDTP and sulfur-containing metal detergents. In contract, Shirahama is totally silent about this feature of the present invention, and rather all the Examples of this reference contain a sulfur-containing metal detergent, and most of the Examples contain ZnDTP. Deterioration of lubricant performance by the addition of such sulfur-containing metal detergents is specifically demonstrated in Comparative Example 2-1 of the present application.

Therefore, it is respectfully submitted that amended claims 1 and 6, as well as claims 2-4 and 7-8 depending therefrom, are not obvious over Shirahama.

Claims 1-8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2, 4-6, 8-10, 12, and 14 of copending Application No. 10/567,311.

In response to this rejection, a Terminal Disclaimer and the requisite fee are being filed along with this response.

Based on the preceding comments and amendments, and in view of the Terminal Disclaimer filed with this response, the subsisting claims are believed to be in condition for allowance and such action is earnestly solicited.

Dated: March 9, 2009

Respectfully submitted,

By _____
S. Peter Ludwig
Registration No.: 25,351
DARBY & DARBY P.C.
P.O. Box 770
Church Street Station
New York, New York 10008-0770
(212) 527-7700
(212) 527-7701 (Fax)
Attorneys/Agents For Applicant